DOCUMENT RESUME

ED 474 303 EC 309 482

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TITLE	Auditory Processing Disorders: An Overview. ERIC Digest.
INSTITUTION	ERIC Clearinghouse on Disabilities and Gifted Education, Arlington, VA.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
REPORT NO	EDO-EC-02-12
PUB DATE	2002-12-00
NOTE	4p.; Digest number E634.
CONTRACT	ED-99-CO-0026
AVAILABLE FROM	ERIC Clearinghouse on Disabilities and Gifted Education, Council for Exceptional Children, 1110 North Glebe Rd., Arlington, VA 22201. Tel: 800-328-0272 (Toll Free); Fax: 703-620-4334; e-mail: ericec@cec.sped.org. For full text: http://www.ericec.org.
PUB TYPE	ERIC Publications (071) -- ERIC Digests in Full Text (073)
EDRS PRICE	EDRS Price MF01/PC01 Plus Postage.
DESCRIPTORS	*Auditory Evaluation; *Auditory Perception; *Auditory Training; *Classroom Environment; Classroom Techniques; Clinical Diagnosis; Cognitive Processes; Etiology; Language Processing; *Learning Disabilities; Learning Processes; Learning Strategies; *Student Characteristics; Symptoms (Individual Disorders); Teaching Methods
IDENTIFIERS	*Central Auditory Processing Disorders; ERIC Digests

ABSTRACT

This digest presents an overview of children with auditory processing disorders (APDs), children who can typically hear information but have difficulty attending to, storing, locating, retrieving, and/or clarifying that information to make it useful for academic and social purposes. The digest begins by describing central auditory processing and the behaviors of children with APD. Academic characteristics of children who have APD are identified; these include poor expressive and receptive language abilities; poor reading, writing, and spelling; poor phonics and speech sound discrimination; difficulty taking notes; difficulty learning foreign languages; weak short-term memory; and behavioral, psychological, and/or social problems resulting from poor language and academic skills. Clinical diagnosis of APD and the role of audiologists in assessing the peripheral and central auditory systems are also explained. The digest closes with a list of classroom techniques that have been shown to be effective with children with APD, including: (1) modify the environment by reducing background noise and enhancing the speech signal to improve access to auditory information; (2) teach the child to use compensatory strategies, "meta" strategies, or executive functions to learn how to listen actively; and (3) promote auditory training to remediate specific auditory deficits. (CR)

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ED 474 303

AUDITORY PROCESSING DISORDERS: AN OVERVIEW

ERIC DIGEST E634

BY
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DECEMBER 2002

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
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Digest
E634

EDO-EC-02-12

December 2002

Auditory Processing Disorders: An Overview

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Children who have difficulty using information they hear in academic and social situations may have central auditory processing disorder (CAPD), more recently termed auditory processing disorder (APD). These children typically can hear information but have difficulty attending to, storing, locating, retrieving, and/or clarifying that information to make it useful for academic and social purposes (Katz & Wilde, 1994). This can have a negative impact on both language acquisition and academic performance.

What is central auditory processing?

When the ears detect sound, the auditory stimulus travels through the structures of the ears, or the peripheral auditory system, to the central auditory nervous system that extends from the brain stem to the temporal lobes of the cerebral cortex. The auditory stimulus travels along the neural pathways where it is "processed," allowing the listener to determine the direction from which the sound comes, identify the type of sound, separate the sound from background noise, and interpret the sound. The listener builds upon what is heard by storing, retrieving, or clarifying the auditory information to make it functionally useful.

What is a disorder of auditory processing?

APD is an impaired ability to attend to, discriminate, remember, recognize, or comprehend information presented auditorily in individuals who typically exhibit normal intelligence and normal hearing (Keith, 1995). This definition has been expanded to include the effects that peripheral hearing loss may contribute to auditory processing deficits (Jerger & Musiek, 2000). Auditory processing difficulties become more pronounced in challenging listening situations, such as noisy backgrounds or poor acoustic environments, great distances from the speaker, speakers with fast speaking rates, or speakers with foreign accents (Sloan, 1998).

What are the behaviors of children with APD?

Children who have auditory processing disorders may behave as if they have a hearing loss. While not all children present all behaviors, Keith (1995) offers the following examples of behaviors that may be displayed by children who have APD:

- Inconsistent response to speech
- Frequent requests for repetition (What? Huh?)
- Difficulty listening or paying attention in noisy environments
- Often misunderstanding what is said
- Difficulty following long directions
- Poor memory for information presented verbally
- Difficulty discerning direction from which sound is coming
- History of middle ear infection.

What are academic characteristics of children who have APD?

In addition to the preceding behaviors, children may also present a variety of academic characteristics that may lead teachers and parents to suspect APD. Baran (1998) offers the following characteristics. Again, all children will not present all characteristics.

- Poor expressive and receptive language abilities
- Poor reading, writing, and spelling
- Poor phonics and speech sound discrimination
- Difficulty taking notes
- Difficulty learning foreign languages
- Weak short-term memory
- Behavioral, psychological, and/or social problems resulting from poor language and academic skills.

How is APD diagnosed?

Given the complexity of auditory processing disorders, it is important to involve a multidisciplinary team including psychologists, physicians, teachers, parents, and of course, audiologists and speech-language pathologists. Audiologists diagnose the presence of APD (hearing and processing problems), and speech-language pathologists evaluate a child's perception of speech and receptive-expressive language use. Other team members conduct additional assessments to determine a child's educational strengths and weaknesses. Checklists that ask teachers and parents to observe the child's auditory behaviors may be used to determine a need for the APD evaluation. The parent's description of the child's auditory behavior at home is an especially important contribution to the diagnosis of APD.

What does the audiologist do?

The audiologist assesses the peripheral and central auditory systems using a battery of tests, which may include both electrophysiological and behavioral tests. Peripheral hearing tests determine if the child has a hearing loss, and, if so, the degree to which the loss is a factor in the child's learning problems. Assessment of the central auditory system evaluates the child's ability to respond under different conditions of auditory signal distortion and competition. It is based on the assumption that a child with an intact auditory system can tolerate mild distortions of speech and still understand it, while a child with APD will encounter difficulty when the auditory system is stressed by signal distortion and competing messages (Keith, 1995). The test results allow the audiologist to identify strengths and weaknesses in the child's auditory system that can be used to develop educational and remedial intervention strategies.

How should test results be interpreted?

As with any kind of evaluation, test results should be interpreted with caution. The effects of neurological maturation may influence test results for children under the age of 12 years. A true diagnosis of APD cannot be determined until that time (Bellis, 1996). However, there are much younger children whose auditory behaviors, language, and academic characteristics indicate that APD is a strong possibility, and even without a formal diagnosis, these children would benefit from intervention. Remediation should address their strengths and areas of need based on available speech-language and psychoeducational testing.

Is there a relationship between APD and ADHD?

The behaviors of children with APD and ADHD may be very similar, especially with regard to distractibility. Given what is presently known, APD and ADHD do not appear to be a single developmental disorder. Each can occur independently, or they can coexist. This is a prime example of where the team approach to evaluation is critical, as the team can rule out the presence of ADHD or determine its contribution to the potential educational impact on the child.

What can be done to help children with APD in the classroom?

Traditional educational and therapeutic approaches can be employed to remediate areas of need in language, reading, and writing. Many techniques that have shown to be effective with children with APD would be beneficial to all children, with and without APD, if the strategies employed are specific to the child's areas of need (Bellis, 1996; Chermak & Musiek, 1997; Sloan, 1998). Some of these are described below:

- Modify the environment by reducing background noise and enhancing the speech signal to improve access to auditory information:
  - Eliminate or reduce sources of noise in the classroom (air vent, street traffic, playground, hallway, furniture noises, etc.).
  - Use assistive listening devices (ALDs) such as a sound field amplification system or an FM auditory trainer.
  - Allow preferential or roving seating to ensure that the child is seated as close to the speaker possible.
  - Allow the child to use a tape recorder and/or a peer notetaker.
  - Ensure that the speaker gets the child's attention before speaking, and considers using a slower speaking rate, repeating directions, allowing time for the child to respond to questions, pausing to allow the child to catch up, and presenting information in a visual format through overheads, illustrations, and print.
- Teach the child to use compensatory strategies, "meta" strategies, or executive functions to teach how to listen actively. The child should:
  - Learn to identify and resolve difficult listening situations.
  - Develop skills to understand the demands of listening: attending, memory, identifying important parts of the message, self-monitoring, clarifying, and problem solving.
  - Develop memory techniques: verbal rehearsal (reauditorization), mnemonics (chunking, cueing, chaining).
  - Encourage use of external organizational aids: checklist, notebook, calendar, etc.
  - Develop vocabulary, syntax, and pragmatic skills to facilitate language comprehension.
- Provide auditory training to remediate specific auditory deficits:
  - Children who have poor reading, writing, and spelling skills may benefit from phonological awareness activities.
  - Auditory closure activities may assist children in filling in or predicting the information they are listening to in the classroom and conversations.
  - Instruction in interpreting intonation, speaking rate, or vocal intensity, and in the relationship between syllable and word may assist children in determining important parts of the message.
  - When the child has demonstrated success on the above tasks in a quiet environment, give the child practice engaging in the same tasks in an environment that includes background noise.
  - Explore the use of commercially available computer programs designed to develop the child's attention to the phonological aspects of speech. These should be recommended by a professional who can determine their applicability to the child's needs.

Resources

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